PH-AAA-383

HIBIT III

A LOW-COST
AIR TRANSPORTATION AND COMMUNICATION SYSTEM
FOR
REMOTE AREAS OF THE PHILIPPINES

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FOR
REMOTE AREAS OF THE PHILIPPINES

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A LOW-COST AIR TRANSPORTATION AND COMMUNICATION SYSTEM FOR THE PHILIPPINES

It is proposed that there be established a low-cost transportation and communication system for the Philippines which will make a substantial contribution to the peacetime economic and political development of remote areas of the Philippines presently inaccessible to surface transportation and which cannot be served economically by commercial air carriers.

THE SYSTEM

Over-all Description

Improved communication and transportation within the Philippines is essential for the economic and political development of the country. From an economic standpoint, many areas cannot develop adequately until goods and people can travel into and out of the area with greater regularity. From a political standpoint, many of the areas tend to become isolated from the central government to the extent that means of direct communication and transportation are unavailable.

The tremendous costs involved in laying out complete modern telecommunications and regular air transportation facilities throughout the Philippines, however, mean that long term priorities for financing of such facilities have to be determined. Vast areas in the Philippines will of necessity be without such costly facilities for many years to come. If these areas are to be politically and economically integrated with the rest of the country, some low-cost means must be found of providing necessary communications and transportation. The proposed system of the National Air Communication Systems, Inc. (NAIRCOM)[1] can fulfill these needs.

The system described in this proposal is patterned after the JAARS system (Jungle Aviation and Radio Service), which is now working successfully in a number of countries, including Bolivia, Brazil, Ecuador and Peru. A small JAARS operation employing two Helio aircraft is also currently operating in the Philippines. The Director of Operations for NAIRCOM, Mr. Lawrence J. Montgomery, was formerly the Director of Operations for JAARS for a number of years and supervised the installation of their system in several areas, including the Philippines, where he spent two years. Information concerning the JAARS system and the conditions under which it is successfully operating is enclosed with this proposal. In brief, the experience of JAARS demonstrates the complete feasibility of establishing an efficient low-cost aviation and radio network servicing outlying areas of a country where no communication or transportation service now exists.

Types of Equipment Required

The proposed system is built around the capabilities of the new STOL[2] type aircraft -- such as the new six-place Helio single-engine Courier model and the six to eight place Helio twin-engine model. (See attachments for specifications and photographs). The Helio airplane has proved itself in rugged off-airport operations over the last seven years. Not only is the Jungle Aviation and Radio Service (JAARS) now using the Helio in its remote area activities in the Philippines, Peru, Bolivia, Brazil and Ecuador, but this rugged short-field airplane has also been selected by the Civil Air Transport (CAT) airline for its contract operations in the more remote and rugged areas of Southeast Asia.

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[1] see Appendix, The NAIRCOM Organization.

[2] STOL (Short Take-Off and Landing) means the ability to operate from small open fields or sections of roadways less than 200 yards in length safely on a day-to-day basis without requiring expensive, surfaced runways.

The U.S. Air Force has recently started using the same airplane (designated as the USAF, L-28A) as a lower-cost replacement for helicopters for portions of the Strategic Air Command missile-base support operation and for logistic service in other areas.

The plane operates on skis and floats as well as wheels. Its short-take-off and landing (STOL) capabilities permit scheduled servicing of areas possessing only the most rudimentary landing facilities. These aircraft operate regularly from landing strips only a few hundred feet in length. In many remote areas, such strips are prepared and maintained by local citizens on a no-cash-cost basis. In addition to its ability to take-off and land in very small areas, the plane carries five passengers plus pilot. Its total useful load is over 1600 pounds.[3] It has a range of approximately 800 miles (or 1600 miles with military fuel tanks), and a top cruising speed of 170 miles per hour.

Of particular significance is the Helio's unequalled safety record. A recent review of FAA safety records showed that to date there are no recorded fatal accidents in any certificated Helio, in spite of the fact that this airplane is now in its eighth year of service with many being operated over jungle and other rugged areas throughout the world. Two outstanding characteristics account for the plane's safety record: first, its ability to maintain fully controllable level flight at speeds of less than thirty miles perhour, and, second, an unusually strong cabin-seat arrangement that is designed to withstand a crash impact of fifteen times the force of gravity.

In addition to the single-engine Helio Super Courier, a new twin-engine version of the plane will be available for phasing into the program. The new H-500 model will thus provide twin engine reliability for long over-water flights and for night instrument flying. It will have an increased cruising speed and will initially carry 6 occupants. (When the new small T-63 turbo-prop power-plant is available for commercial uses, the Helio twin so powered will carry 8 occupants.)

To complete the proposed NAIRCOM network, each landing area will be equipped with a two-way, self-contained battery powered radio. (See attached photograph in the Appendix.) This is a special radio that has been developed by engineers of a leading electronics corporation in cooperation with JAARS and NAIRCOM personnel especially for service in hot-humid remote areas. This simple two-way ground system affords not only ground-to-air communications, but also permits ground-to-ground communications over an approximate 500 mile range, thus providing a very low-cost remote area radio communications network for news, weather reporting and other purposes. The radio system will, in addition, assure immediate availability of air transportation in the event of police or medical emergency needs, as well as for routine control of air operations.

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[3] At present (February 1962), the Helio Courier is certificated under Part 3 of U.S. Civil Air Regulations at 3000 lbs. gross weight, and operates at 3920 lbs. gross weight under Part 8 ("for industrial purposes only"). The airplane is, however, now being prepared for re-certification as a six place model with 3900 pounds gross weight under CAR Part 3.

PEACETIME USES OF THE NAIRCOM SYSTEM

The almost complete lack of communications and transportation facilities to connect the principal cities with many of the remote areas is generally considered to be one of the major problems confronting the country in its efforts to secure greater economic development. A means whereby men and materials can be transported into and out of these areas is essential, for economic development cannot really commence until such means of communication have been established.

The principal means for securing communication into such new areas has usually been by the construction of a highway, railroad or airport. Unfortunately, the cost of such facilities is enormous, because of the ruggedness and isolation of much of the terrain. Construction of conventional aviation or ground transportation facilities into many of these areas will be a relatively slow and costly process at best. Thus, some low-cost means of providing quicker communications and transportation is essential if economic development is not to be delayed for years and possibly even decades.

The proposed NAIRCOM system will provide the communication and transportation facilities necessary for the acceleration of economic development efforts in such remote areas. It will do so at a fraction of the cost that the construction of highways, railroads or modern airports would entail. The system is based upon the use of a low-cost airplane (low both in capital and operating cost), which has been proven both safe and dependable in similar uses elsewhere. Through use of multiples of these flexible low-cost units, it is possible to carry substantial loads of men and goods into and out of a particular area.

For example, a particular site may normally require only a five passenger capacity airplane for most scheduled trips. If, however, fifteen to thirty passengers might require transportation at a peak-load time, it is far more economical to utilize a multiple of three to six of these aircraft for such occasional peakloads -- instead of flying empty seats with larger aircraft on all the other trips.

Such a system combines all the basic advantages of a complete aerial system of communications, without the usual disadvantage of high cost -- both for the type of equipment involved and for the type of ground facilities required. Almost any cleared field 400 to 600 feet in length will suffice for a landing area.

Such aircraft also can perform a number of direct services important to economic development, including aerial surveys, agricultural crop spraying, forest fire fighting, etc. The radio equipment at each area being served can also be used in a number of ways in addition to directing an airplane in flight or assisting in take-offs and landings. The equipment provides a ready means of reporting news, weather information, and business or emergency communications.

Dependable communications and transportation give rise to the establishment and expansion of business enterprises and activities. When a businessman knows he has easy access to potential sites for business activities, the area obviously becomes more attractive. Probably the most important feature of all, however, is the ability of the system to maintain a constant contact between the remote areas and the rest of the country. By providing regular aerial service, the system can be of inestimable value in combating the isolation felt by the citizens of the remote areas and in integrating them economically, socially and politically into the rest of the country.

MILITARY BY-PRODUCTS OF THE NAIRCOM SYSTEM

This proposal involved the establishment of a system designed primarily to accelerate the economic and political development of the outlying and remote areas of the country. It is to be hoped that the system will be used in the future for what it is -- a key part of the peacetime economy -- and will never have to be diverted to defense purposes. However, mention of the possible military by-product values of the system appears appropriate.

One of the greatest military threats to the country comes from possible para-military or guerrilla warfare, and the NAIRCOM system has many potential military applications for use in combating such activity.

The Helio Courier's range, speed and all-weather capabilities permit it to operate in areas and under conditions not practicable for helicopters. Its maintenance and pilotage requirements are far simpler, and its costs much lower.

The plane is highly effective as a "flying jeep" for the transportation of personnel, food, medicine, ammunition and other logistical support operations in remote battle areas. Its ability to get in and out of short, unprepared landing strips makes it able to support dispersed military operations of the type usually encountered in anti-guerrilla activities. The plane has also proved to be unusually effective in low-level, slow-speed strafing and bombing missions, especially in confined or concealed areas.

Its ability to fly at speeds of less than 30 miles an hour makes the plane unusually well suited for protracted patrol and surveillance work it established an official world's altitude record for small piston-powered aircraft in 1957. This high service ceiling makes the plane effective for photo reconnaissance at all altitudes up to 30,000 feet. (For missions above 20,000 feet, the supercharged version of the same Lycoming engine is employed).

A special cargo door modification of the plane allows easy handling of air drops of personnel and equipment, as well as for litter loading. The plane's litter capacity makes it an effective and quick way to move wounded to hospital areas.

The radio communication network of the proposed system also has significant military applications. It can be used to support or supplant military communications. The radio network at the remote landing strips can both provide weather and military intelligence information.

It is proposed that the NAIRCOM system be manned to the maximum extent practicable by Air Force reserve pilots, mechanics and technicians. This will provide a highly trained and skilled reserve force -- maintained on a self-supporting basis -- and always available on a moment's notice for military duty in time of national emergency. The experience gained by the pilots in flying the remote landing strip routes of the system will be similar to that required for missions in time of national emergency. The pilots will be able to attain and maintain specialized flying skills and proficiency in a way that few active duty military pilots can achieve. The mechanics and technicians would, of course, be performing the same tasks, whether in peacetime or war.

PROPOSED TECHNICAL ASSISTANCE CONTRACT

NAIRCOM proposes to provide technical assistance for the system in its early and formative years, and thereby make available the experience gathered from establishing other similar type systems in other countries. A budget estimate for the proposed technical assistance is attached hereto.

NAIRCOM proposes to provide technical assistance at the outset for all key supervisory positions below the General Manager and headquarters office staff. To accomplish this organizing, training and initial supervisory function, five key U.S. technicians are proposed. At the end of the initial three-year period, the major technical assistance and training phase should be completed. For the next two years only a Director of Operations and the Senior Maintenance Supervisor would remain on location, with a Liaison Technician also provided to facilitate transition thereafter. During the fourth and fifth years the specified supply and support functions will be continued by the U.S. office. The initial technical service contract will then terminate at the end of the fifth year.

Thereafter, it is proposed that, if a U.S. financing agency has extended a repayable loan to assist this program, the U.S. financing agency may maintain one NAIRCOM engineer on location to provide continuing technical assistance, plus possible provision for a bi-annual management operational review and report by NAIRCOM until the U.S. loan is liquidated.

Specifically, NAIRCOM proposes that the contract for technical assistance provide for the following functions:

1. Assembly and Start-up. Assemble and check-out all aircraft and radio equipment upon arrival; establish base of operations, including administrative and repair facilities; select and train all local personnel required for the system.

2. Maintenance. Provide initial specialized maintenance supervision for STOL equipment; recruit local aircraft and radio mechanics and conduct their transition training; establish maintenance procedures for aircraft and radio equipment; set up parts inventory and develop inventory control procedures.

3. Flight Operations. Recruit pilots and conduct STOL flight transition training. Prepare flight schedules. (When desired and for as long as needed, NAIRCOM will also assume responsibility for staffing and manning the complete flight operations program.)

4. Airstrip Development. Establish technical standards for selection of landing strips; advise on economic factors to be considered in selecting each site; investigate potential landing areas; supervise landing area preparation; train local landing area attendants in radio operation, field maintenance and communication functions.

5. Flying Safety. Establish specialized STOL flight rules and safety procedures; establish STOL landing strip standards and specific operational limits (such as allowable weather minimums, crosswind conditions, loading, etc.); establish and implement flight safety inspection and informal "certification" procedures for these STOL operations (similar to those administered by FAA Air Carrier Flight Safety Division for U.S. airlines)

6. Technical Developments. NAIRCOM's headquarters staff, by concentrating on this highly specialized new STOL type operation and by serving operators in various parts of the world, will endeavor to keep each user informed on new technical developments, operational techniques and equipment improvements. This service is a "bonus" involving no added cost or charge.

In order to perform these functions, NAIRCOM proposes to provide specialized U.S. technical personnel as follows:

	1st Three Years	4th & 5th Years	Continuing Liaison
-- Director of Operations	x	x	
-- Chief Flight Instructor	x		
-- Senior Maintenance Supervisor	x	x	
-- Radio & Instrument Supervisor	x		
-- Airstrip Development Engineer	x		
-- Liaison Technician		x	x
Total U.S. Personnel	5	3	1

DEVELOPMENT OF THE SYSTEM

Phases of Development

The NAIRCOM system is based on the concept of an orderly and systematic step-by-step expansion of the air and communications network. A minimum period of three years is needed to establish and fully develop a system which will provide adequate coverage for a substantial portion of the remote areas of the country. A system designed to service up to a maximum of 120 remote landing areas and which has a reserve for emergency and non-scheduled flights should serve substantial areas of the country which are now inaccessible to conventional air or surface transportation.

The development schedule of the system has inherent flexibility so that the timetable of expansion and development can be accelerated or delayed if experience and the needs of the country dictate a quickening or slowing of the program. It is strongly recommended, however, that financing be obtained at the outset adequate for a complete system of the approximate size suggested.

The establishment of the NAIRCOM system, as envisioned, would be comprised of three phases. These include: the first phase -- preliminary planning and operations; the second phase -- training and development; and the third phase -- final build-up.

During the first phase, a period of approximately three to four months, the foundation for the system would be laid. The first contingent of NAIRCOM technical advisors would arrive and set up operational planning and training. Their initial assignment would be to complete the detailed planning study, after coordination and consultation with the appropriate governmental and military officials. Delivery of the first Helio would take place at the beginning of this phase. The NAIRCOM staff would use it for liaison and survey and training missions. The training program for pilots, mechanics and the site development staff would begin simultaneously. An operations base would be selected and any necessary leases or purchases of facilities arranged. The administrative organization would start its build-up. During the last half of the first phase, the first three landing strips would be selected and prepared.

The second phase of operations, which would consist of the second, third, and fourth quarters of the first year would see primary emphasis placed on training of personnel and development of the network. During the initial three months of this second phase, three Helios would be delivered at the rate of one per month. The air and communications network would begin to function on a limited scale. The training of the site development staff would be completed and work would begin on laying out new landing strips. It is anticipated that the staff should be able to attain a capability of completing three strips per month during this first year. In addition, the detailed study would be completed and the master blueprint for the total development of the system completed. The training programs for pilots and mechanics would move into full swing. The administrative organization would complete its build-up. The chief of flying safety would begin to function and develop flying safety rules and regulations.

The last two quarters of the first year would see the full pattern of expansion come into focus. Four Helio Couriers would be delivered and integrated into the system every three months. All training programs would be fully established and at normal levels. The military reserve STOL training program would also begin its initial operations.

The third and final phase, which covers the second and third years of the program, completes the system development. During the first quarter of the second year, the first twin-engine Helio would be delivered at an initial rate of one per quarter. For the second half of the second year, the rate would be increased to two per quarter. For the final year, the rate of twins would then be increased to three per quarter. Delivery of the single-engine Helios would drop to two per quarter when the twins are first delivered and then the rate would level off at one per month for the rest of the final build-up period. New airstrips would be introduced into the system at a rate of five per month for the second year, tapering off to three per month during the third year as the final network of an anticipated maximum of 120 landing strips is completed.

The chart ("Development of the NAIRCOM System") in the Appendix demonstrates how the system would be expanded and developed.

Airstrip Development

The NAIRCOM system is designed to serve a network of up to a maximum of 120 remote airstrips. Each of these would receive a varying amount of service depending on the scale of economic, political and social development of the community that the airstrip serves.

It is contemplated that the airstrips would be classified into four categories, according to the frequency of service required. Class A airstrips would be those whose need for regularly scheduled air arrivals would amount to four or more per week. Class B airstrips would be those receiving one to four arrivals per week. Class C airstrips would be those receiving one arrival per week or one arrival every other week. Class D airstrips would have no regularly scheduled service, but would be serviced on an on-call, emergency or other basis. Of the maximum of 120 airstrips envisioned for the system, there might reasonably be approximately 30 airstrips of each class.

Each airstrip would be equipped with a specially designed two-way trans-ceiver, which has been described previously. Daily radio communication between all airstrips, no matter how large or small, would be assured.

The physical requirements for each airstrip would be approximately the same, with the possible exception of Class A airstrips whose frequency of service might require installation of a small building capable of handling arrivals and departures in all weather conditions. In some cases, a more permanent landing strip surface might also prove desirable. Otherwise, all landing strips would normally be of a length of approximately 600 feet. The surface of each strip would be prepared from any available material such as gravel, grass, hard packed dirt, crushed stone, etc. It is only essential that each strip be reasonably level and free from obstacles, such as tree stumps, large rocks and boulders, gulleys, etc., as possible. In addition, there should be no overhanging branches and drainage should be good. A sketch of a typical landing area with desirable dimensions is set forth in the Appendix.

An operations building may be desirable at each of the more active airstrips, so located as to have a commanding view of the entire length of the runway. Here the airstrip agents would be quartered with the two-way radio and any weather or other equipment that might be available. The building should also have simple facilities for accommodating passengers, luggage and cargo.

The elaborateness of each airstrip would be limited only by the resourcefulness and imagination of the local citizens. However, the basic design and construction of each strip initially would be under the supervision of a NAIRCOM site development expert. Guidance would be provided as to the best possible site for installation of the strip. The expert would demonstrate how the site should be cleared and prepared for receiving airplanes.

Maintenance Facilities

The NAIRCOM system will establish a facility capable of handling all needs for maintenance of these STOL aircraft and the specialized electronic equipment. A complete shop will be equipped according to NAIRCOM specifications and will be under the supervision of the NAIRCOM maintenance supervisor. The maintenance specialists manning the shop will be under the direct supervision of maintenance supervisors trained and accredited by the airplane manufacturer (Helio) and by the engine manufacturer (Lycoming). NAIRCOM has been designated as the official service representative for Lycoming-powered, Helio STOL-type aircraft in this region.

The NAIRCOM shop will have hand tools, machines and equipment necessary to meet all requirements. A parts inventory will be established and adequate stock levels maintained as the system is developed and expanded. A stock room will be designed and built which will accommodate all parts inventories.

The maintenance supervisor will establish and conduct a training program for mechanics, assistant mechanics and helpers. The training course will minimize classroom lectures and maximize on-the-job training where each individual will be given an evaluation of his skills, with his training then tailored to meet his needs. This type of highly individualized training is possible because the orderly build-up of the system allows maintenance requirements to be programmed far in advance.

A similar training program will also be established for the electrical maintenance personnel. It will be patterned after the other training program and will be under the supervision of the NAIRCOM electrical maintenance supervisor.

Full Scale Operations

Once the expansion of the system is completed, the training functions taper off to minimal levels and the network functions at its maximum size. Fifty-four aircraft -- thirty-six single engine Helio Super Couriers and eighteen twin-engine Helio H-500's -- will be servicing up to an anticipated maximum of 120 airfields on a scheduled basis with an adequate reserve for emergency or other non-scheduled flights. The radio communications network will be functioning to its capacity bringing daily contact between all remote landing strips and the rest of the nation. Weather and other data will be relayed from all outlying areas. (News might also be broadcast to all areas and business and other communications relayed to areas where other radio facilities may not be existent). The mail, passengers, and cargo will be dispatched according to regular schedules, and pilots, mechanics, technicians and administrative personnel functioning at high levels of proficiency. Revenues from mail and communications contracts as well as income from handling of passenger traffic and cargo will then begin to place the system on a paying basis.

OPERATING ORGANIZATION

Organizational Structure

The Philippine Government, through the Philippine Air Force or some other agency, will hold legal title to the airplanes, radio equipment, hangars, maintenance facilities and other tangible goods of the system. NAIRCOM proposes, however, that this equipment and these facilities be leased to a separate agency or corporation created for the sole purpose of managing the business and economic development functions of the system. It is essential that the system be managed on a businesslike basis; that every effort be made to put the system on a self-supporting basis as quickly as possible and that an organization manage the system which can be held strictly accountable for its financial success.

There are a number of forms the organization could take and the final selection will, of course, be made by the Philippine Government after a review of the possible alternatives. No matter what form the organization may take, however, NAIRCOM believes that the program should be set up with the expectation that the system will be managed by a combination of experienced businessmen and aviation specialists under private enterprise. Employment of a private management organization appears desirable: (1) as a means of securing specialized commercial and traffic development experience, and (2) as a means of assuring that the organization can be subjected to the necessary types of restraints, disciplines and incentives that governmental authorities can effectively impose on private corporations, but only with difficulty, if at all, can enforce on other governmental offices.

NAIRCOM proposes that a management corporation, which we shall here refer to as PHILCOM, be established as a stock corporation. For an initial three-year period, PHILCOM would be entirely owned by the Philippine Government and managed by NAIRCOM under contract. Under the technical assistance contract discussed in this proposal, the NAIRCOM organization will provide all initially required technical assistance for the system. It will, for instance, train Philippine pilots, mechanics, and technicians in the specialized aspects of the new types of equipment. NAIRCOM's technical assistance contract might also well be expanded to include the management of the system for the initial three-year period, during which time NAIRCOM will help build the local PHILCOM organization to the point where it will be capable of assuming full operating responsibilities. At the end of that period, the Government would have the option of renewing the NAIRCOM contract, insofar as management responsibilities are concerned, for successive two-year periods of time, or of terminating the contract and arranging for the sale of the controlling interest in PHILCOM to private Philippine citizens.

The Government for its part could continue to retain PHILCOM as a strictly contract management organization -- serving simply as a replacement for NAIRCOM -- or, it might elect (and this we believe will prove more advantageous) to tap the drives of free enterprise by incorporating into the contract variable compensation based upon performance and net revenues. The Government might even find it most advantageous to lease some of the equipment and assign the commercially self-supporting route segments entirely to private management under PHILCOM. This is the successful JAARS' pattern in Latin America. These questions, however, the Philippine Government can best decide in its own interests as experience unfolds.

Personnel Requirements and Training

The objective of the NAIRCOM proposal is to establish a system that, when fully developed, will be completely operated and managed by experienced and well-trained local citizens. To achieve this objective NAIRCOM technicians will establish and operate training programs designed to give local pilots, mechanics, technicians and administrative personnel specialized training in STOL aircraft operations and maintenance, as well as the fundamentals and techniques of successful operations and management. Since the keystone of the NAIRCOM proposal is an orderly build-up of the system over a three-year period, the training programs will be designed to provide indigenous local personnel who are thoroughly trained and experienced for integration into the system as the need for their services arises.

The three-year period of development allows virtually all training to be conducted on an individual basis with primary emphasis being placed on "on-the-job" training, rather than formal classroom lectures. The training schedules will be established to coincide roughly with the delivery of the aircraft into the system. During the three-year build-up, 36 single engine Helio Couriers will have been delivered at a rate of approximately one per month. For every six single-engined Helio introduced into the system, six pilots, two A & E mechanics, four assistant mechanics and line boys, and one electrician/instrument specialist are needed. Initially, pilots will be trained for the STOL operations at a rate of twelve per year, while mechanics will be trained at a rate of one every three months. Assistant mechanics and line boys will be trained at a rate of four every six months and one electrician/instrument specialist will also be trained during that period.

For the 18 twin-engined H-500s, the manpower requirements vary slightly from those of the single-engined Courier, so the training schedules will be modified accordingly. Eight pilots are needed to support six Helio twins. Four A & E mechanics, six assistant mechanics and line boys, and one electrician/instrument specialist are needed for ground support. Thus, during the second year of the build-up (the year when the first six Helio twins are to be delivered), the training program would be expanded accordingly. In the third year, when twelve Helio twins are to be delivered, the manpower requirements (and the corresponding training involved) would be doubled.

The training of the administrative staff would be the responsibility of the Director of Operations and would be scheduled according to the needs of the developing system. The Director of Operations would also train the Chief of Flying Safety.

The chart ("Organization Chart") in the Appendix indicates the organizational structure of the system after the completion of the training programs and the approximate numbers of personnel needed to operate the system when fully developed.

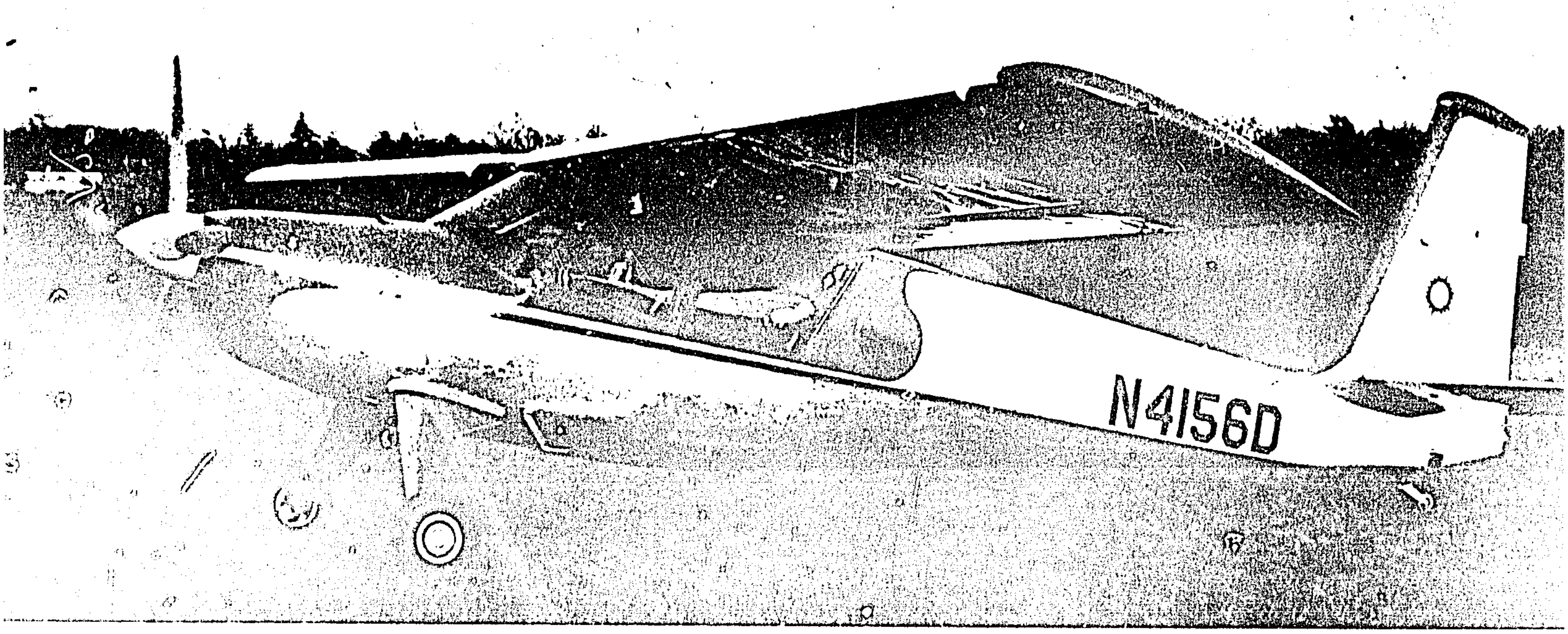
Operating Expenses

The major costs of the system will involve expenditures for fuel and oil, salaries for the staff, spare parts for aircraft and electronic equipment, administrative overhead, depreciation and insurance, and other items. A detailed estimate of these costs during the three year development period and for each year thereafter is set forth in the Appendix. It must be remembered that these costs are estimates and may be subject to fluctuations brought about by factors which cannot be identified until the system goes into operation. In addition, these cost estimates were prepared only for the purpose of identifying the major cost areas, and may not reflect actual wage rates and other costs which will be in effect when the system actually goes into operation.

These figures demonstrate the exceptional low-cost of the system. Translated into cost per passenger mile the system can move a single passenger an air mile for approximately 3.8¢.

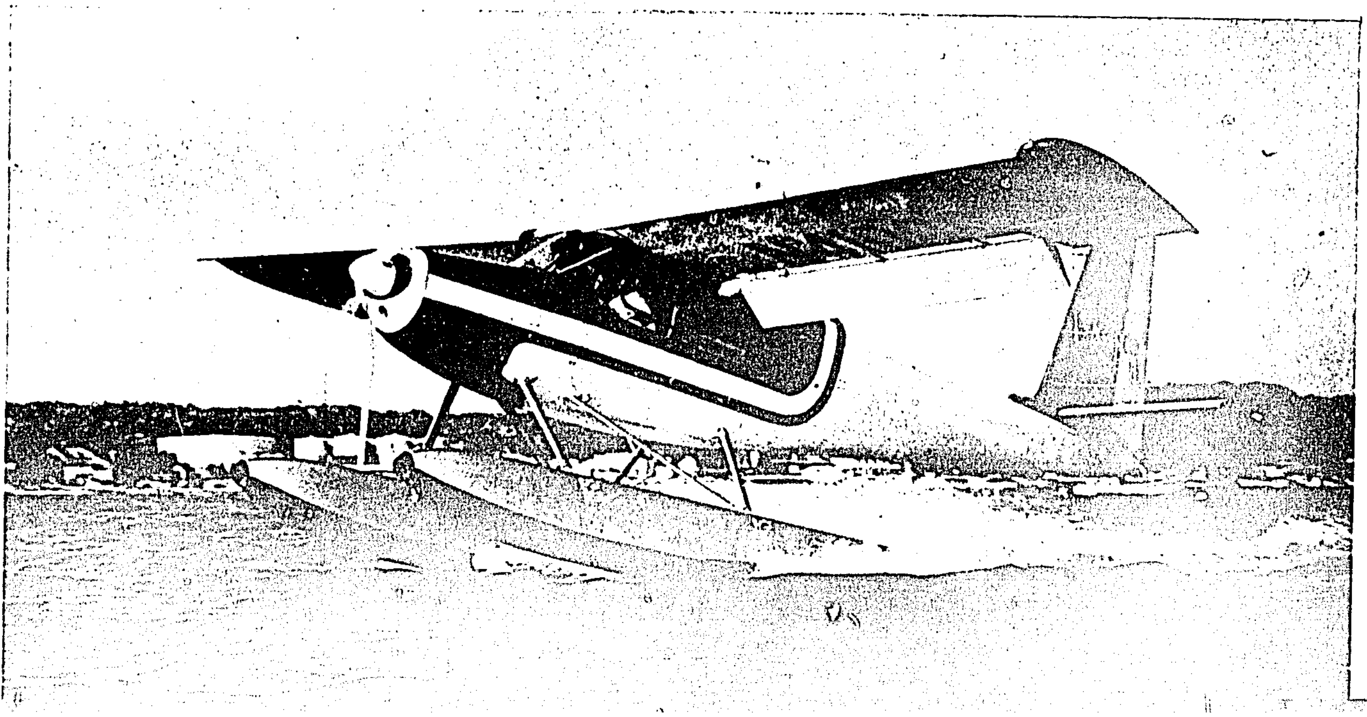
Helio Aircraft Corporation

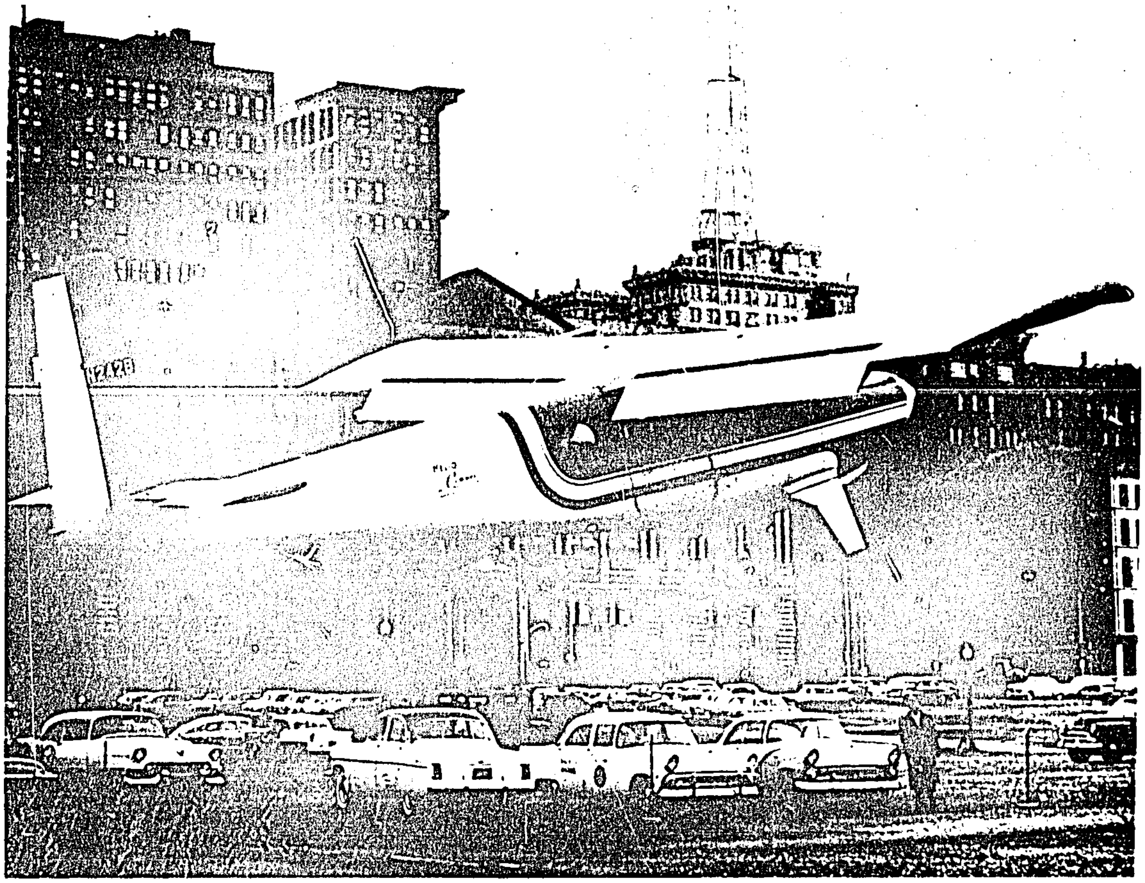
THE HELIO COURIER



Now . . . Two Models Offering . . .

- EVEN SHORTER TAKE-OFF
- MORE VISIBILITY
- GREATER HORSEPOWER
- IMPROVED GROUND HANDLING
- FASTER CRUISE
- INCREASED RATE OF CLIMB





Stall-proof, slow speed landing demonstrated in St. Louis parking lot.

FACTS ABOUT THE "HELIOPLANE"

SUPER COURIER MODEL H-395 OPERATIONAL DATA:

Minimum, fully controllable level flight	Under 30 mph
Performance cruise 8500 ft. 69% T.O. power	Over 170 mph
Take-off and landing: 10 mph wind, 5 occupants	44 yds.
over 50 ft. obstacle	118 yds.
Range: with 60 gal. fuel capacity	Over 850 miles
Useful Load: at 3000 lb. design gross (C.A.R. 3)	960 lbs.
with cargo and crew only (C.A.R. 8)	1880 lbs.
Service ceiling: with compensated carburetor	Over 22,500 ft.

Power: 295 hp geared Lycoming, GO-480-G1D6

Dimensions: wing span 39' — length 30' — height 8' 10"

Hartzell Constant Speed Hydraulic Propeller — 96" diameter — 3 blades

CERTIFICATED ON WHEELS AND WHEEL-SKIS.

COURIER MODEL H-395A OPERATIONAL DATA:

Minimum, fully controllable level flight	Under 30 mph
Performance cruise 8500 ft. 69% T.O. power	Over 160 mph
Take-off and landing: 10 mph wind, 5 occupants	53 yds.
over 50 ft. obstacle	141 yds.
Range: with 60 gal. fuel capacity	Over 800 miles
Useful Load: at 3000 lb. design gross (C.A.R. 3)	1010 lbs.
with cargo and crew only (C.A.R. 8)	1930 lbs.
Service ceiling: with compensated carburetor	Over 20,000 ft.

Power: 260 hp geared Lycoming, GO-435-C2B2

Dimensions: wing span 39' — length 30' — height 8' 10"

Hartzell Constant Speed Hydraulic Propeller — 101" diameter — 2 blades

CERTIFICATED ON WHEELS, WHEEL-SKIS, AND FLOATS.

Built to last 20 years, the HELIO COURIER is an all-metal 5 passenger aircraft certificated since 1953. Designed for operation from small, unprepared fields, thereby offering quicker point-to-point transportation, the Courier's speed ranges from a cruise of over 170 M.P.H. down to a stall-proof 30 M.P.H.

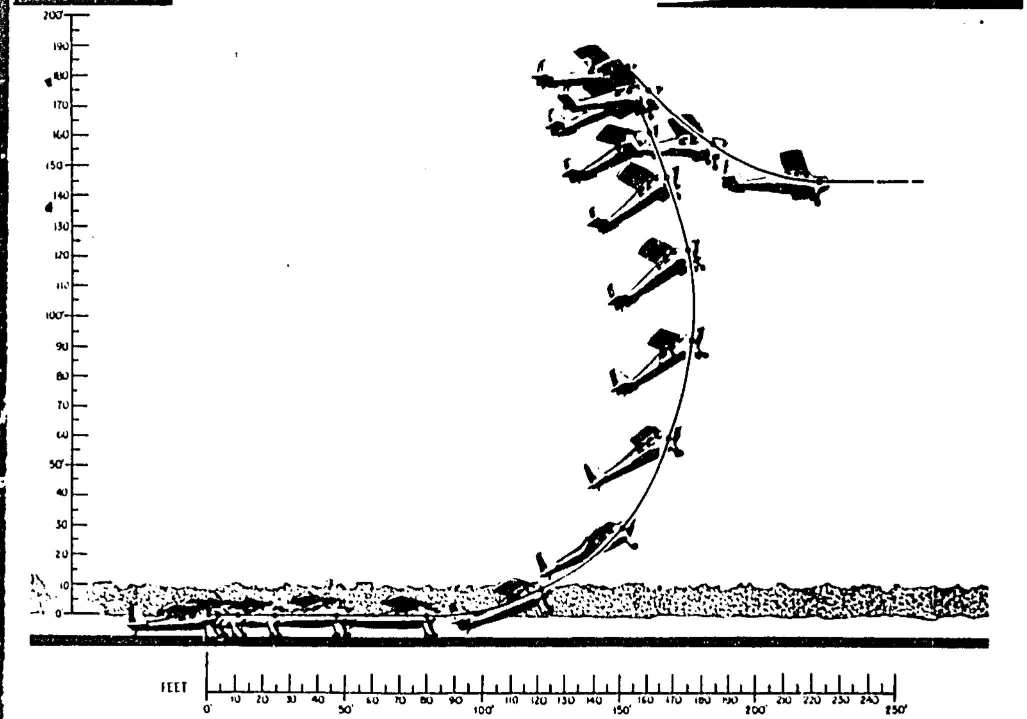
While outstanding performance has been the basic concept in Courier design, safety is of equal importance. This safety has been built into the Courier in the form of a resilient, tubular steel cabin structure into which seats, seat belts, and shoulder harnesses stressed for 15-Gs have been incorporated.

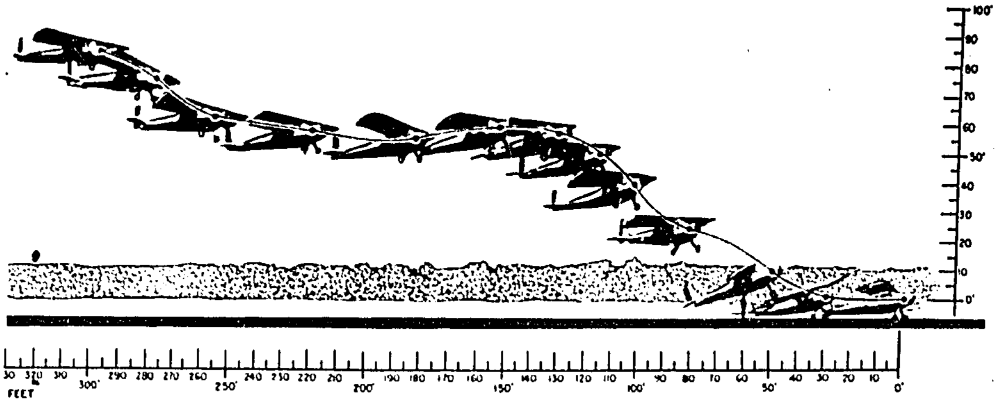
Operations throughout the world under continually adverse conditions have proven the Courier's dependability and testify to the outstanding quality, performance, and safety which the Helio Aircraft Corporation offers to civilian and military aviation.

HELIO AIRCRAFT CORPORATION
RESEARCH CENTER: Norwood, Massachusetts

C.A.A. VERIFIED

Official C.A.A. sequence photographs taken at one frame per second. Shows on linear foot scale take-off and landing distances required over a fifty-foot barrier with 18 MPH wind.





COMBINING
FOR THE FIRST TIME
IN ANY PLANE

- **High Speed, Long Range Economy**
- **Stall-Proof Slow Flight**
- **Ultra Short Field Utility**

SPECIALLY DESIGNED FOR

Executive plant side transportation.

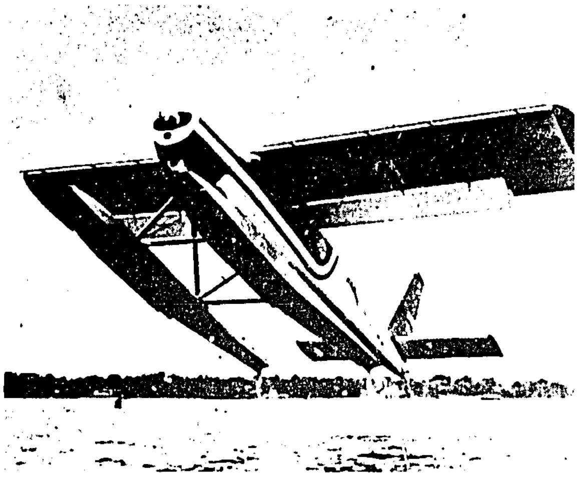
Airborne oil and minerals exploration.

Off-airport transportation to mining and construction sites.

Agricultural applications including timber inspection, crop dusting and spraying.

High and low altitude aerial photography and reconnaissance.

Government and military applications including border patrol, liaison, low speed observation, stretcher evacuation,, light supply and personnel transportation.



The HELIO COURIER gives same efficient performance on water as on land. Fitted with Edo floats, the Courier opens up new possibilities for air-water travel. It can also be equipped with Federal Wheel-Ski Combination for snow or land strip operation.

MANUFACTURING PLANT
Mid-States Manufacturing Division
Pittsburg, Kansas

DOMESTIC SALES OFFICE
Norwood, Massachusetts
Boston Telephone: CAnton 6-1295

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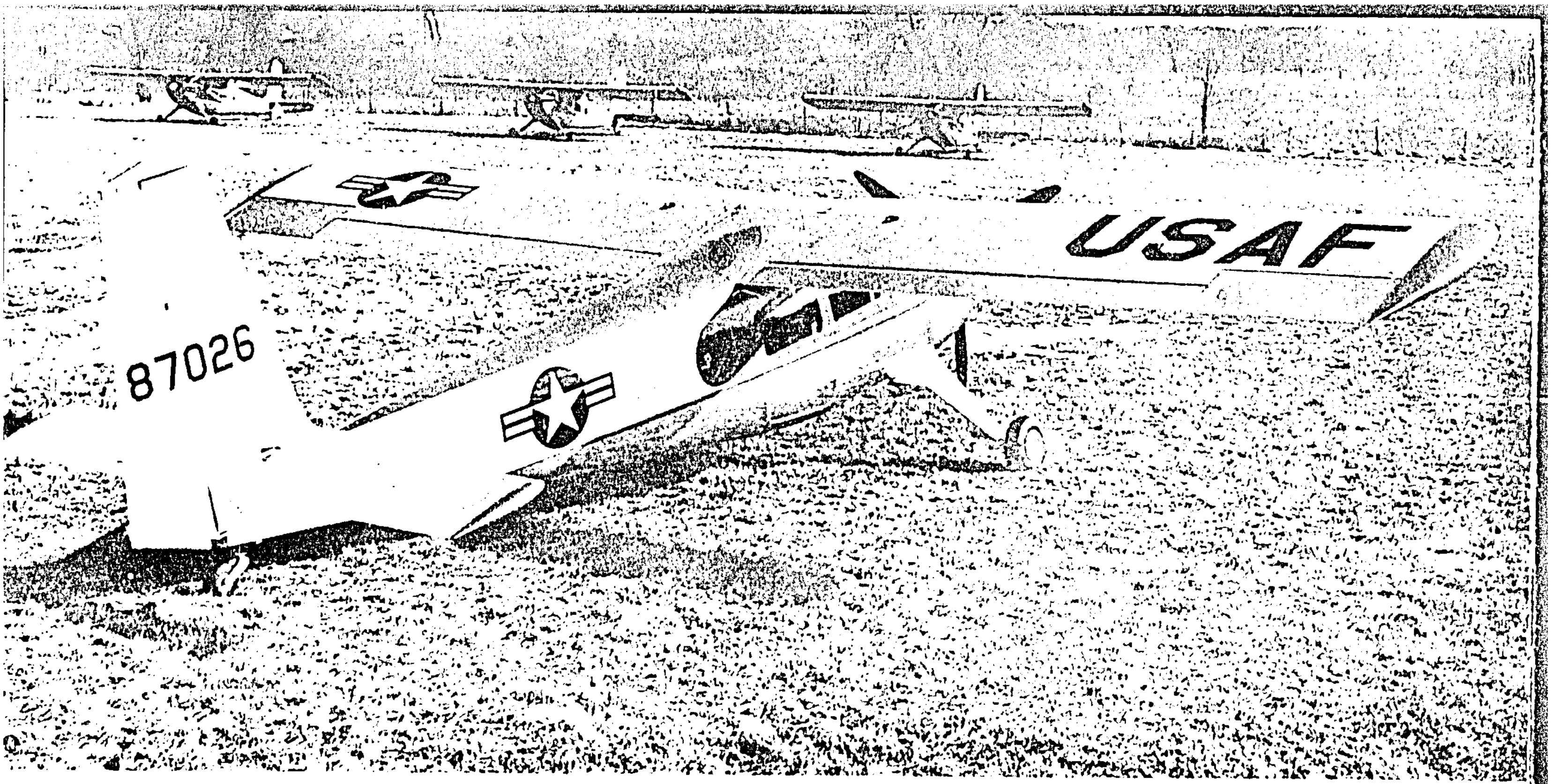


Pictured above is the USAF L28 Helio Super Courier Model H-395

UNIQUE ADVANTAGES REPORTED BY COURIER USERS

1. "*Time saving* and convenience is made possible through our ability to use small unprepared areas. Our factory yards take the place of airports giving us quicker point-to-point transportation than multi-engine ships confined to outlying airports. Short hops over traffic-choked roads also have become practical without the complexities of the helicopter at a fraction of the cost and over twice the speed."

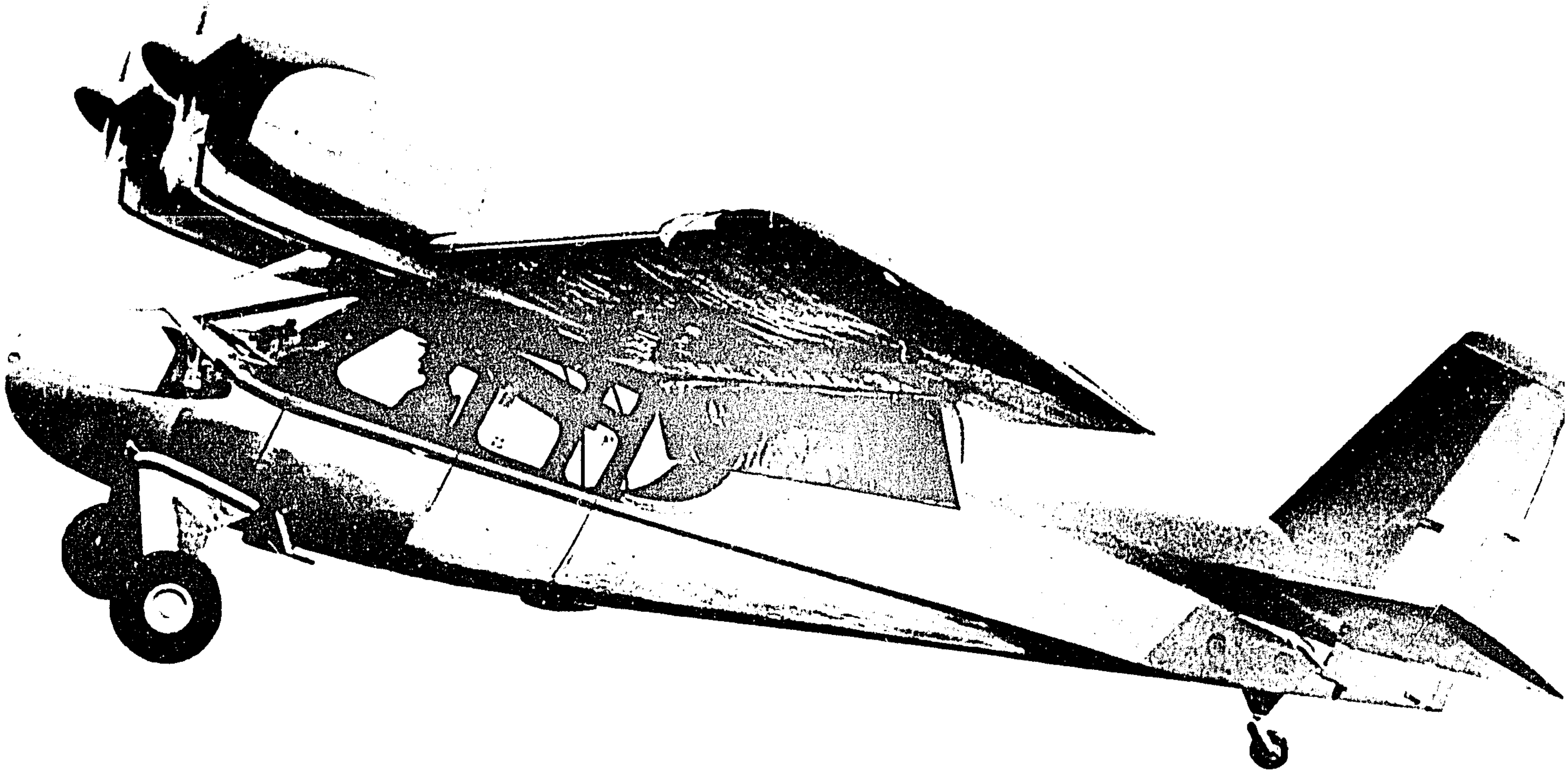
2. "*Schedule dependability* previously attainable only with our twin-engine airplanes and a two-man crew is made possible by the Courier's ability to proceed safely even when very low ceilings and restricted visibility are encountered en route. Many times we have used its ability to slow down without danger of stall, make a short-radius turn and then continue on safely under the weather."

3. "*Simplicity of operation* is important to me as a recently licensed businessman-pilot. The ability to slow down gives me ample time to re-judge and alter my course if the need arises. The perfect control and stability even at very slow speed take the effort out of my flying."

4. "*Peace of mind* not commonly attained in our previous single-engine aircraft, especially over bad terrain or after dark, is provided through ability to descend slowly without risk of stalling and to land almost anywhere." (From an altitude of 1000 feet, for example, the power-off gliding range covers an approximate 12-square-mile area within which many openings of more than 75 yards are commonly available, even in mountainous terrain. The power-off rate of descent is less than that of a parachute.)

the time and service proven **HELIO COURIER**

LAT [illegible] 1X WPC LITHO IN U.S.A. 15



THE NEW TWIN ENGINE MODEL H-500

The new Helio twin engine model H-500 provides innovations beyond the single engine airplane. The engines have been located above the high wing providing unrestricted lateral visibility and minimizing propeller and induction system damage from debris commonly encountered on unimproved terrain. Forward visibility, limited in all single engine airplanes, is outstanding in the Helio twin. Many other excellent twin features are ■ *multi-engine reliability* ■ *improved range* ■ *increased payload* ■ *greater maximum cruise speeds* ■ *easy loading access* ■ *flexible seating arrangements* ■ *larger capacity cockpit and low interior sound level.*

PART I

STOL AIRCRAFT DEFINED

as recommended for Port of New York Authority:

To define those aircraft currently permitted to use the existing STOL (Short Take-Off Landing) 400 x 200 feet pads at Teterboro and Laguardia airports.

A. LANDING AND TAKE-OFF REQUIREMENTS

1. Less than 100 meters (328 ft.) required for take-off and landing run with no-wind; and less than 200 meters required to land and take-off between 15 meter (50 ft.) barriers.
2. With normal pilot skill and regardless of wind, operable on almost any unimproved cleared area 150 by 30 meters that a four-wheel-drive truck might be able to traverse at 15 mph. (1 meter - 1.09 yards.)
3. Vertical glide path control so that with normal pilot skill, touch-downs may consistently be held to a minus zero plus 30 meter maximum variation from the intended point regardless of turbulence.

(Part "B" of
STOL defined) ⇨

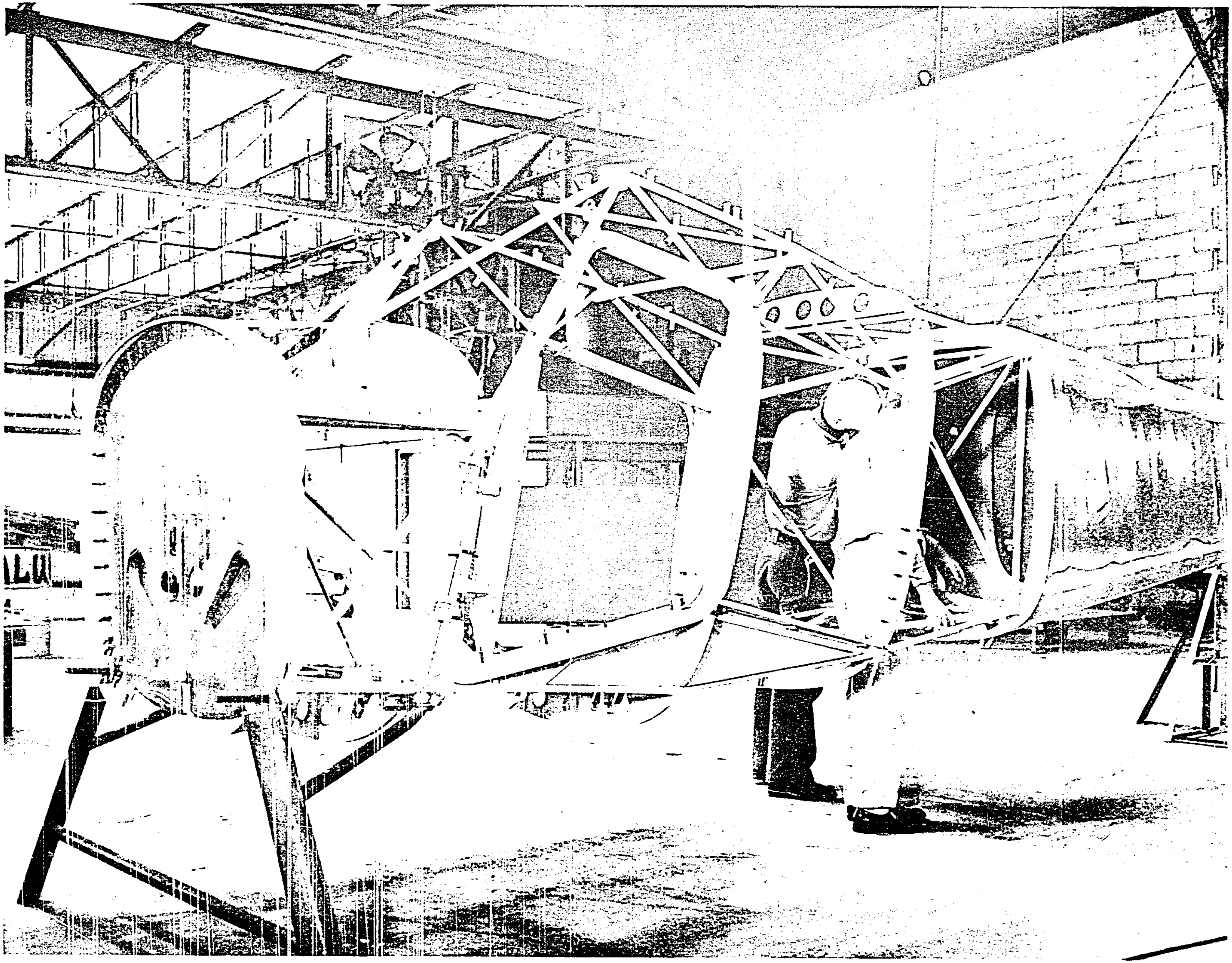
B. SHORT-RADIUS MANEUVERABILITY REQUIREMENTS

1. Capable of spiralling down into, landing and then climbing out of an area 400 meters in diameter surrounded by indefinitely high barriers (i.e., up to at least 15,000 feet).

2. Sharply maneuverable below 45 knots in power-on level flight without stall, spin or loss-of-control when uncoordinated controls are moved abruptly.

3. Turning radius of approximately 100 meters at or below 45 knots without stall, spin or loss-of-control when a 180 degree sharp turn is executed abruptly either up-wind or down-wind with severe turbulence.

**(...but,
to be safe)** ⇨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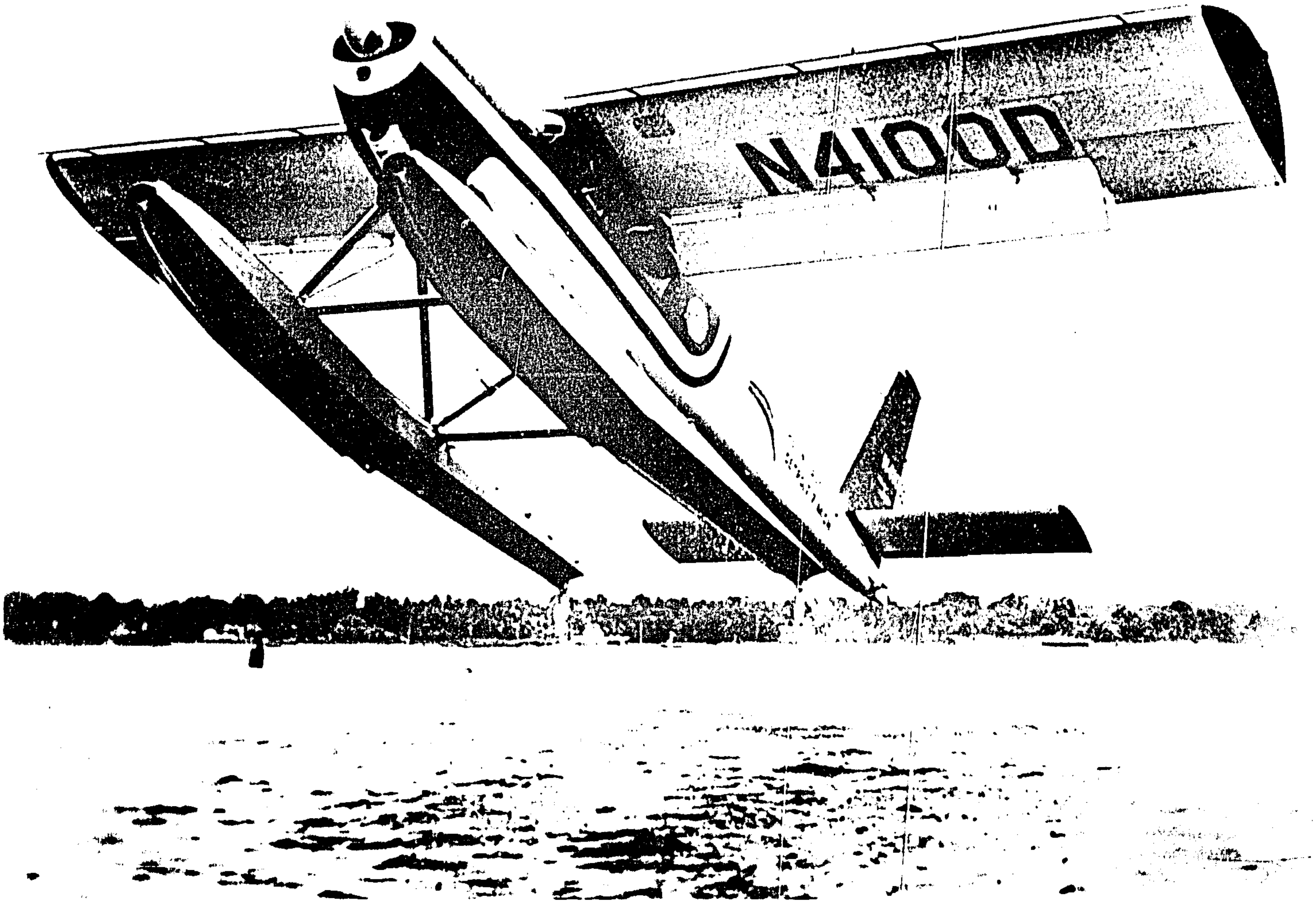

N4100D

TO BE SAFE

Collision with obstructions must be anticipated for confined area operations.

Excessively high fatalities with conventional cabin structures characterize such off-airport operations. Most light aircraft stressed skin structures -- like the shell of an egg -- can withstand tremendous evenly distributed air pressure, but disintegrate when the shell is cracked -- by a fence post or a ditch.

A high energy-absorbing steel-tube truss structure completely surrounding the cabin area and a 15-G shoulder harness has been designed into the L-28A -- based on Cornell Crash Injury Research findings. (More expensive, yes -- but many lives have already been saved.)

An official FAA no-fatality record for the L-28A -- despite numerous demolishments and "fatality-probable" accidents -- has resulted from this recognition of and safeguard against off-airport operational hazards. (1)

(The Key to
STOL feasibility) ⇨

---

(1) This official no-fatality record applies to all FAA-certificated Helios. It excludes two early experimental pre-production prototypes. Also excluded is an unsubstantiated report of an illegal instrument flight by a non-licensed pilot in a Venezuelan mountain thunderstorm, believed to have resulted in a casualty -- but denied by Venezuelan authorities when the FAA inquired, at the manufacturers request.

THE KEY TO STOL FEASIBILITY

Boundary-layer control has been found imperative on the wings of any ultra-short-field airplane that is to accomplish vertical glide path control -- i.e. ability to compensate for gust displacement upward during final approach -- or that is to be safely maneuverable in turbulence at airspeeds below 45 knots.

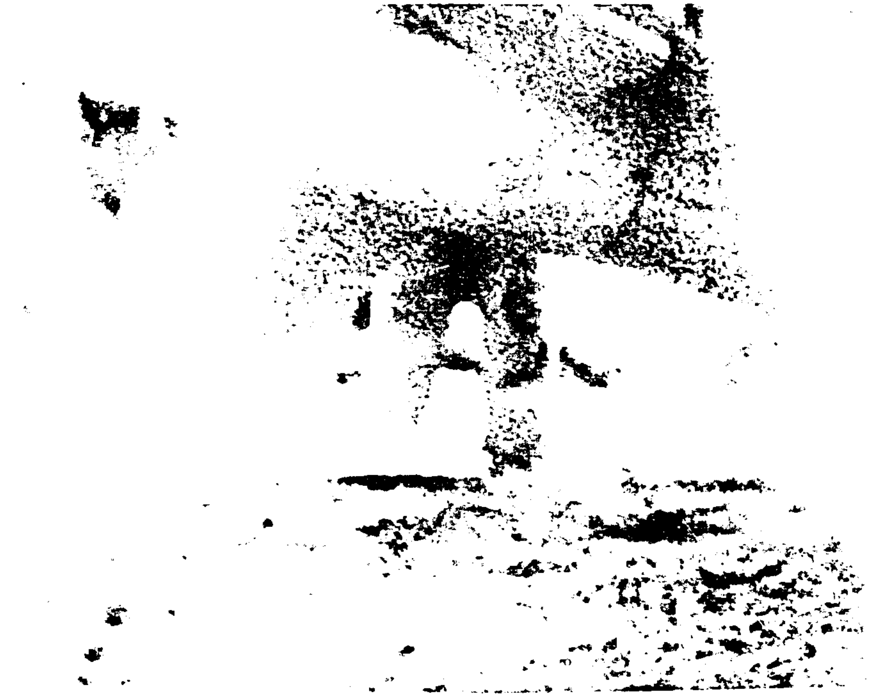
The Handley-Paige leading edge automatic slat, shown here, is the simplest, most positive form of boundary-layer control yet devised. Energized from the in-flight air flow itself, and operated automatically by the shifting air pressure pattern on the wing -- no pumps, springs or controls of any type are required.

Deceptively "almost as good" short-field capability, without boundary-layer control, can be demonstrated under fair weather conditions by an expert pilot with any good light airplane -- but has no practical STOL value unless actually usable in small rough fields under day-in-day-out turbulence conditions.(1)

(For STOL to be practical, yet another feature is required)

---

(1) In recent anti-guerrilla logistic operations in Northern Laos, two L-20s were placed in use alongside six L-28As. Though the L-20s were restricted to minimum strips of 800 feet (vs. 400 feet for the L-28As), both of the L-20s were quickly demolished beyond salvage by inability to compensate for turbulence and thus control the touch-down point. None of the L-28As have to date been lost in operations.



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TO BE PRACTICAL:

For remote area uses, STOL aircraft must be able to operate on unsurfaced strips reduced to deep mud by heavy rainfall -- or covered by snow in unexpected blizzards.

For soft-field operations in sand, snow and mud, the main landing wheels on the L-28A have been moved as far forward as the nose wheel on some tricycle aircraft. This prevents nosing over and provides for better soft-surface flotation than a tricycle nose gear.

The photograph here shows a 550-foot STOL jungle strip in Ecuador hub deep with mud throughout the rainy months, yet used regularly since 1956 for scheduled Helio service -- without disruption.

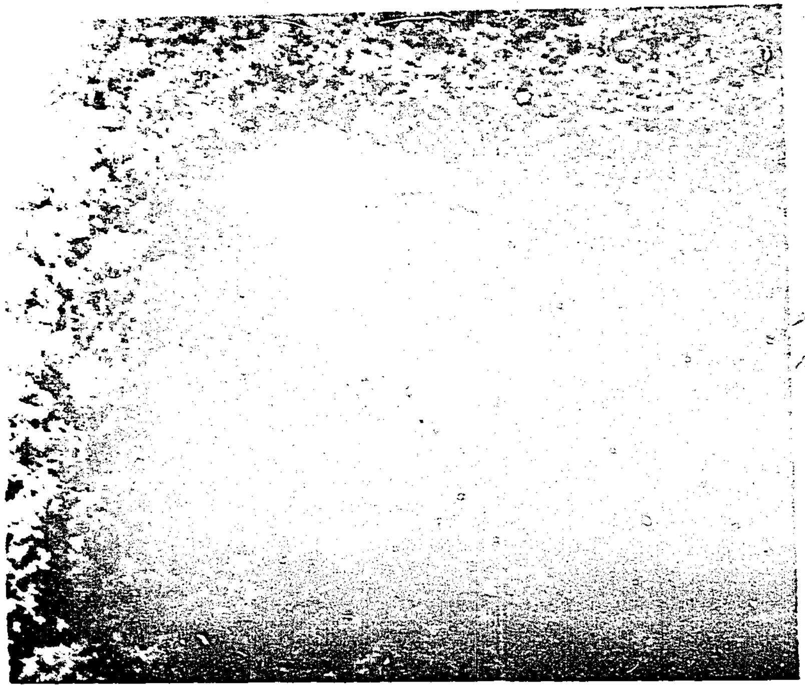
(This same jungle strip from the air)

[illegible]MBI STRIP, ECUADOR
FIELD ELEVATION 3,000'
LENGTH OF STRIP ([redacted]) 550'

TERRAIN - SOFT, LOAMY, HUMID SOIL, PREVAILING CONDITION, HIGH TEMPERATURES AND NO [illegible]
[illegible] 125-150' CLIFF AT THRESHOLD

I OPERATED HELIO AIRCRAFT FROM THIS FIELD WITH GROSS LOAD OF 2855 #
[illegible] WITH FIELD CONDITION AS SEEN ON REVERSE, TAIL WHEEL COMPLETELY
[illegible] AT TIMES AT START OF TAKE-OFF ROLL.

FIELD LIMITED FOR HELIO OPERATION ONLY FOR OBVIOUS REASONS
HAVE OPERATED THE HELIO FROM 9,300 FOOT ELEVATION / 3500# T.O. RUN ESTIMATED TO ABOUT THREE
[illegible] 3000# GROSS
[illegible] HOURS OF THIS TYPE OF OPERATION HAS NEEDED ONLY NORMAL MAINTEN
[illegible] UNDER EXTREMELY ABUSIVE CONDITIONS AS FOUND IN ECUA



Jerry Montgomery
Superintendent of Aviation
Jungle Aviation and Radio Service,
Summer Institute of Linguistics

A typical STOL jungle airstrip in Ecuador used regularly since 1956 by Helio Couriers (civilian version of L-28A). No other so-called "STOL" airplane in production outside the Soviet Union has been found capable of regular operation from such airstrips.

PART II

A SUCCESSFUL STOL ANTI-GUERRILLA SYSTEM

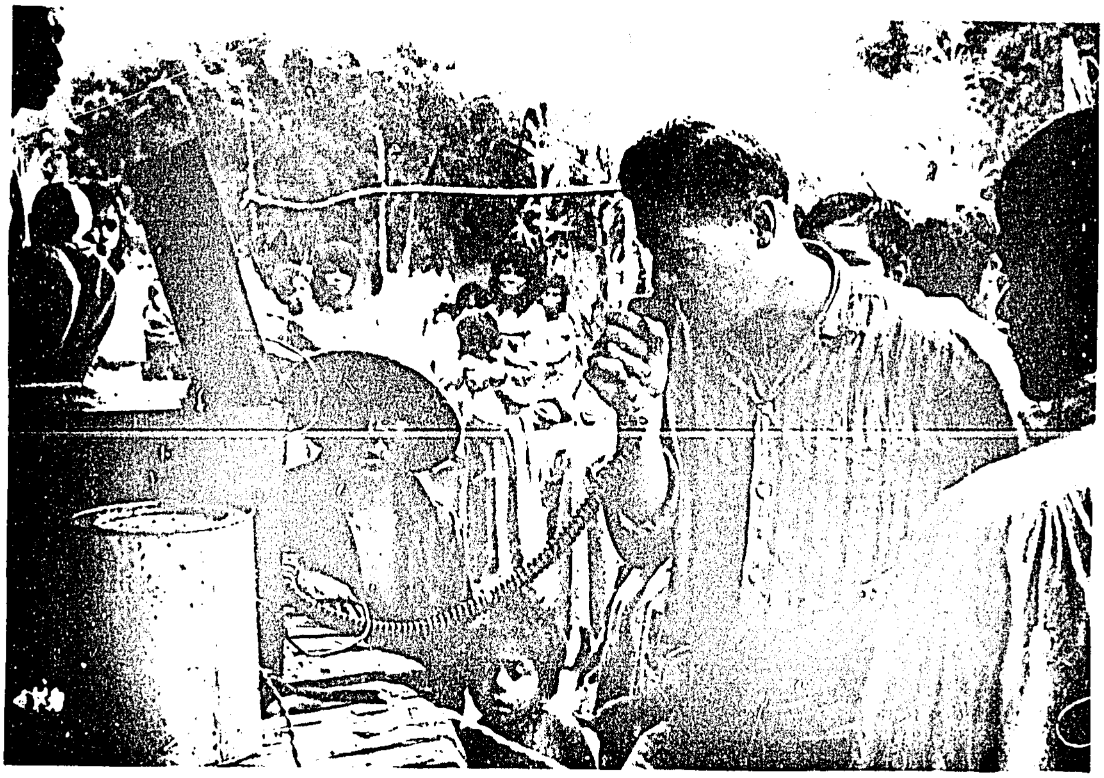
A low-cost self-supporting STOL communications and logistics system is already operating successfully in several remote areas of Latin America.

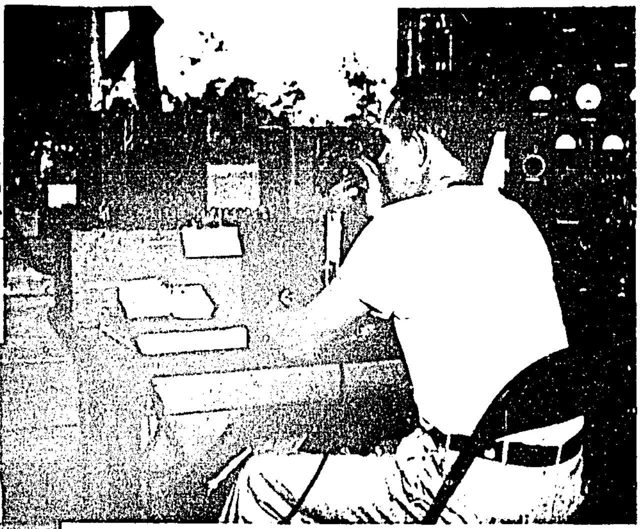
Indigenous labor has been enabled -- with simple hand tools and no engineering -- to install quickly all-weather STOL landing strips wherever approximately 500 feet of reasonably level land could be found, or hand-filled.

The accompanying photograph shows a typical example. This is but one of sixty "no-cash-cost" STOL strips that have been installed in remote areas of Ecuador and Peru -- requiring only a few days of labor by the villagers themselves.

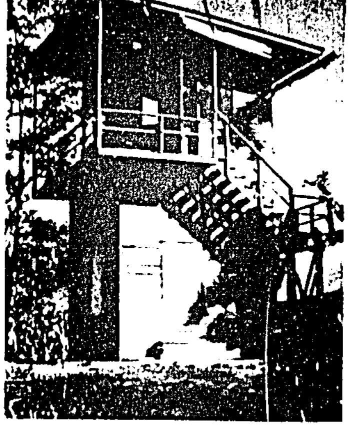
These strips now provide regular communications as well as emergency services. The result has been economic development, political stabilization and complete elimination of the previous guerrilla-type disturbances.

(A companion
radio network)





IN MANILA, JAARS radio technician John Lawless and JAARS Superintendent Larry Montgomery are seen at work in the "radio shack" adjacent to Wycliffe's Manila office. The structure shown here was made from the huge crate in which the U.S. Navy packed the Helio Courier plane *Spirit of Seattle* to take it to the Philippines.

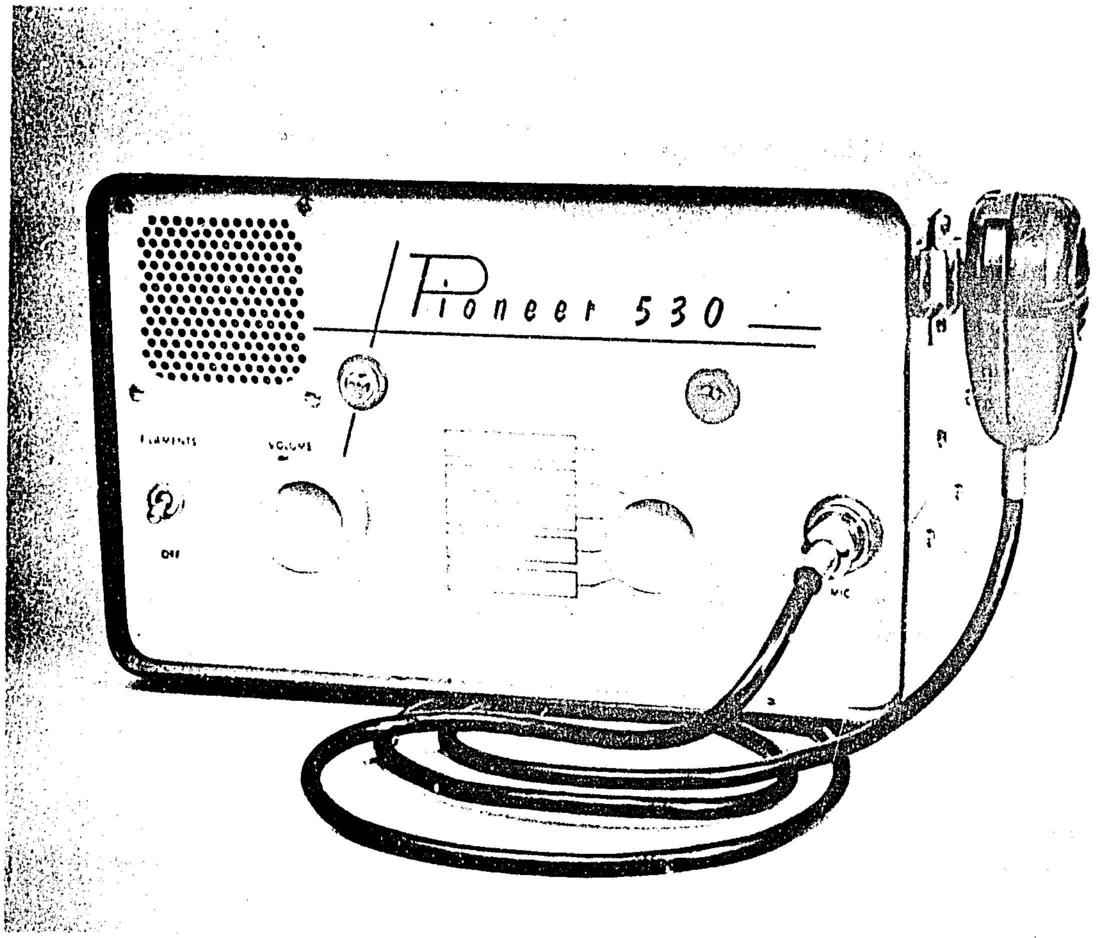


THE RADIO TOWER at Jungle Base, Yarinacocha, Peru, serves also for observation of weather conditions in the immediate vicinity.

AN INTEGRATED LOW-COST RADIO SYSTEM

The nerve system for this remote area development and stabilization is a network of simple low-cost trans-ceiver radios. Each village has instant communication with the provincial center.

The amazingly simple self-powered trans-ceiver radio developed especially for this use has been left for months unattended in these steaming tropical villages and on frozen Andean peaks.



By simply picking up the microphone and pressing one button the indigenous chief makes his daily report, receives news, transmits pertinent intelligence and can call for quick assistance when needed.

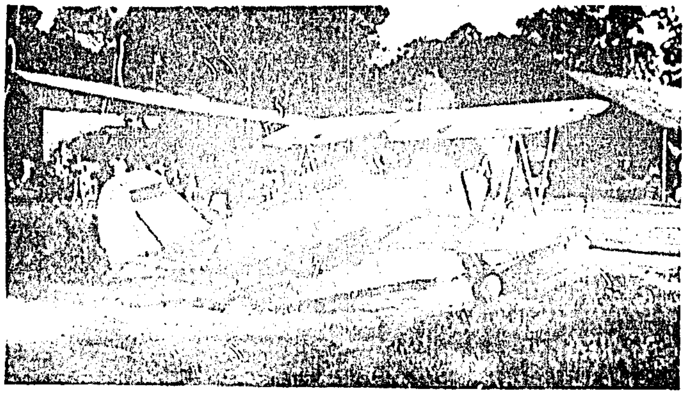
His resulting loyalty and dependence on the centralized government has been matched by his increase in power and prestige among the villagers.

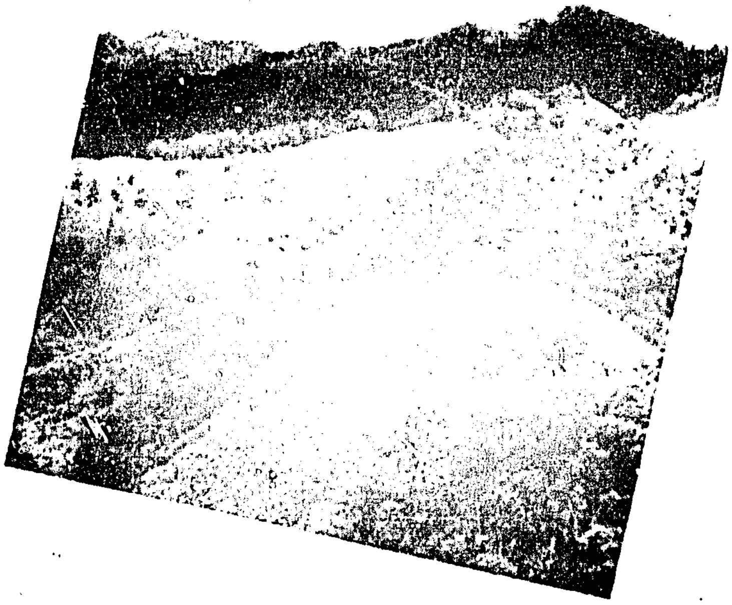
PRESENTATION of the Helio Courier airplane *Spirit of Seattle*, at Washington, D.C.'s National Airport, July 20, 1958. At left: W. C. Townsend (General Director of the Wycliffe Bible Translators, Inc., and Director of JAARS) and Seattle's Mayor Gordon S. Clinton; Mrs. Carlos P. Garcia (center), and President Carlos P. Garcia of the Philippines, at right.

PLANES FOR THE PHILIPPINES

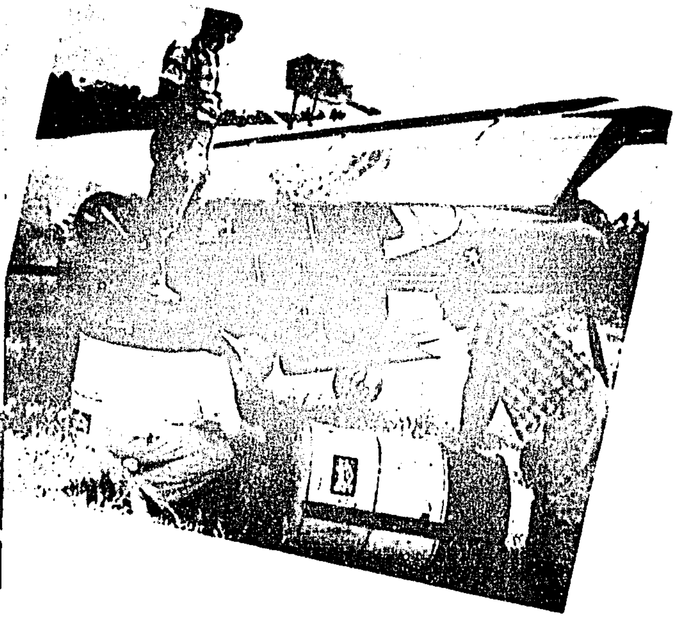
As the fifth plane of the "International Friendship Fleet," the Helio Courier plane *Spirit of Seattle*

WYCLIFFE'S FIRST PLANE, a military surplus Grumman Duck purchased in 1946, is still in service in 1960 after numerous interruptions





VICE-PRESIDENT RICHARD M. NIXON made the formal presentation speech on September 6, 1956, when citizens of his native county in California gave the Helio Courier plane "Friendship of Orange County" to Peru, represented by Ambassador Fernando Berkemeyer (at left).



THE EVOLUTION OF THE JUNGLE AVIATION AND RADIO SERVICE, (JAARS), demonstrates that a similar low-cost system is practicable in other remote areas needing stability and internal protection.

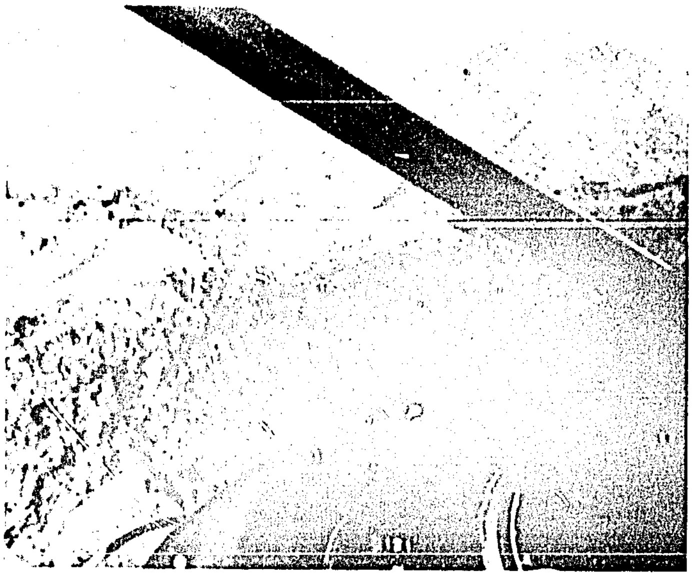
Private citizens have raised funds for the thirty-three plane JAARS system. Vice President Nixon is shown here presenting to the Peruvian Ambassador a Helio contributed by citizens of Orange County, California -- this is one of six Helios similarly contributed to Peru and Ecuador, owned by the national governments and operated by JAARS.

For each remote village that the JAARS program can encompass, there are hundreds of others throughout the more critical emerging nations where this type of air-radio communications system is vitally needed.

The religious objectives of JAARS, however, preclude U.S. foreign aid participation, and its missionary-type personnel are incompatible with police duties.

A new organization, NAIRCOM, drawing on the personnel and the experience of JAARS, has been established to extend this pattern into other critical areas.

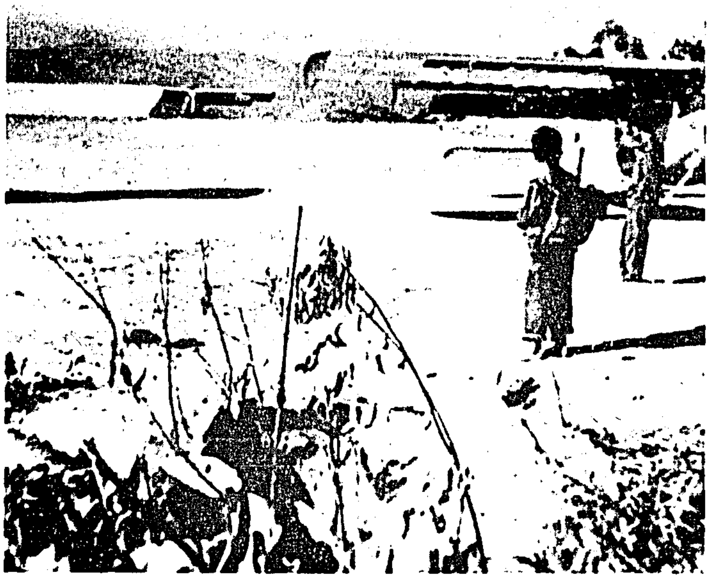
(Another successful operation) ⇨



1. Approach: shows 450 ft. length

2. Final Approach: shows turbulence producing terrain

3. Flare-out: shows 23 ft. width



4. Three Helio's on Location: shows low-cost 1 1/2 ton delivery capability in action

THE NAIRCOM ORGANIZATION

NAIRCOM was incorporated in 1961 to consolidate and expand certain overseas functions previously carried on within three other organizations:

1 - The Jungle Aviation and Radio Service (JAARS) has during the past ten years installed low-cost air-radio communications systems in Peru, Ecuador, Bolivia and parts of the Philippines. Helio Courier STOL type aircraft are the backbone of the 35 plane JAARS fleet. The key technical man in the development of the JAARS system, Lawrence J. Montgomery, served as Director of Operations Upon finding that their missionary objectives limited the further expansion of this much-needed type of air-radio service into other underdeveloped areas, the JAARS organization made possible transfer of Mr. Montgomery to a similar position with NAIRCOM. (JAARS continues independently with its valuable educational and religious work.)

2 - General Aircraft Company of America, Inc. included among its incorporators in 1956 a majority of the directors of Helio Aircraft Corporation, one of whom, Professor Otto C. Koppen of Massachusetts Institute of Technology, had been the key figure in a predecessor General Aircraft Corporation, established in 1939 to promote the design of a small-field airplane Koppen had designed. The successor General Aircraft Company has more recently been engaged in developing uses of the Helio Courier (also designed by Koppen) in remote parts of the world. Its most recent operation in Central Africa was sold to a local operator there, simultaneous with consolidation of General's activities and personnel into NAIRCOM. (General Aircraft is thus discontinuing its overseas functions.)

3 - The overseas service activities of Helio Aircraft Corporation for the less developed countries have been transferred to NAIRCOM. Both Mr. Montgomery and Mr. S.M. Mustard (NAIRCOM's Superintendent of Maintenance) have been trained at the Helio Aircraft factory and are fully qualified to establish Helio maintenance facilities in remote parts of the world. (Mustard is currently setting up such a facility in Southeast Asia).

In less developed parts of the world where NAIRCOM is establishing operations, Helio Aircraft Corporation is designating NAIRCOM as its authorized factory service base. Arrangements have also been made with the Lycoming Division of Avco for NAIRCOM to provide service for Lycoming engines in areas where an authorized facility has not previously been established. (NAIRCOM's overseas maintenance personnel go through Lycoming factory training in addition to their Helio factory training.)

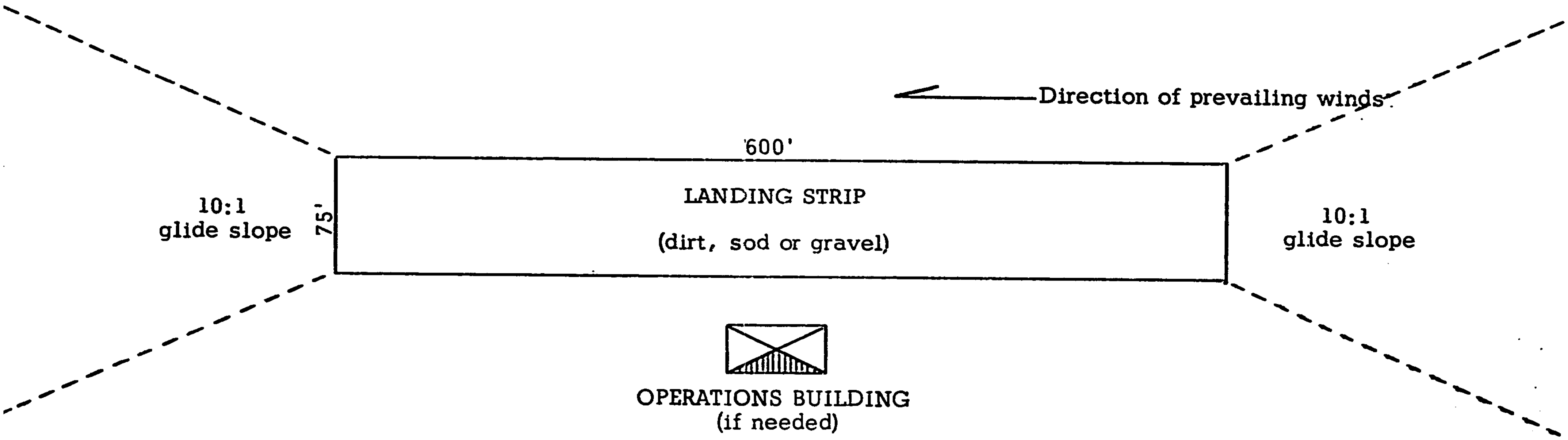
The Board of Directors of NAIRCOM includes three members of the Helio Aircraft Board: Charles A. Rheinstrom (Chairman of Helio); Lynn L. Bollinger (President of Helio); and Robert B. Kimnach (Vice-President of Helio).

NAIRCOM's objective is the installation of low-cost air and radio communications systems in less developed areas. For this purpose, STOL aircraft of the Helio type are the principal, but not the sole aircraft employed. NAIRCOM provides continuing maintenance and pilot services with its own personnel for as long as needed. Its normal procedure is to train indigenous personnel to take over these responsibilities as quickly as possible. NAIRCOM also provides managerial services and technical assistance on a continuing basis when needed.

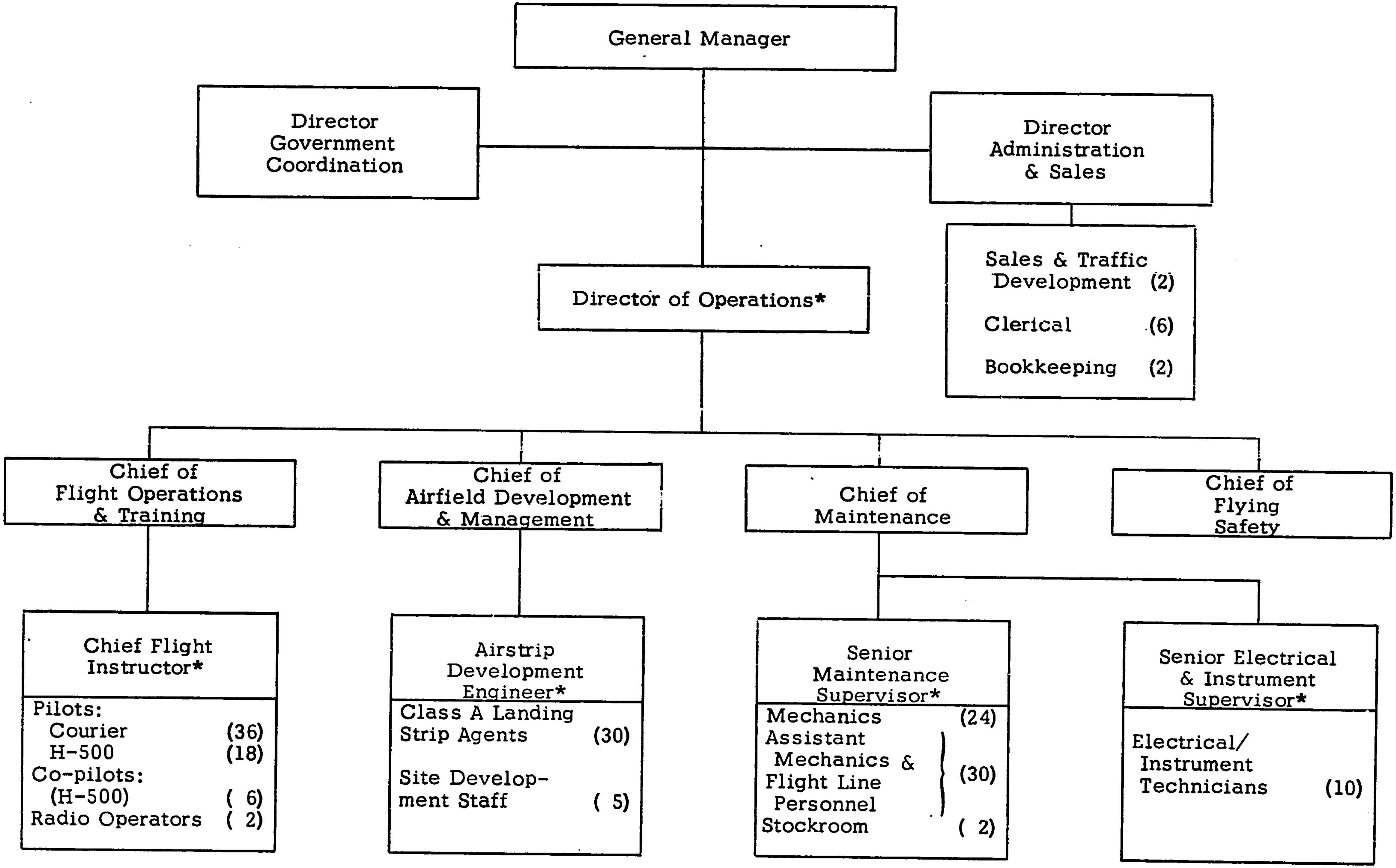
* National Air Communication Systems, Inc.

1500 Massachusetts Avenue, N.W.
Washington 5, D.C.
(Cable: NAIRCOM)

SPECIFICATIONS FOR A TYPICAL REMOTE AIRSTRIP



ORGANIZATION CHART


General Manager
Director Government Coordination
Director Administration & Sales
Sales & Traffic Development (2)
Clerical (6)
Bookkeeping (2)
Director of Operations*
Chief of Flight Operations & Training
Chief of Airfield Development & Management
Chief of Maintenance
Chief of Flying Safety
Chief Flight Instructor*
Pilots:
Courier (36)
H-500 (18)
Co-pilots:
(H-500) (6)
Radio Operators (2)
Airstrip Development Engineer*
Class A Landing Strip Agents (30)
Site Development Staff (5)
Senior Maintenance Supervisor*
Mechanics (24)
Assistant Mechanics & Flight Line Personnel (30)
Stockroom (2)
Senior Electrical & Instrument Supervisor*
Electrical/ Instrument Technicians (10)

* NAIRCOM personnel

DEVELOPMENT OF THE NAIRCOM SYSTEM

Aircraft Deliveries During Three-Year Build-Up

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	TOTALS
FIRST YEAR					
Super Courier (H-395)	1	3	4	4	12
Airstrip Installations	3	9	9	9	30
SECOND YEAR					
Super Courier (H-395)	3	3	3	3	12
H-500 Twin Deliveries	1	1	2	2	6
Airstrip Installations	15	15	15	15	60
THIRD YEAR					
Super Courier (H-395)	3	3	3	3	12
H-500 Twin Deliveries	3	3	3	3	12
Airstrip Installations	9	9	9	9	30

Fourth and Following Years (Full Operation Totals)

Super Couriers (H-395)	36
H-300 Twins	18
Airstrip Installations (A)	120

(A) 30 each of Class A,B,C and D Airstrips.

CAPITAL COSTS OF THE NAIRCOM SYSTEM

Aircraft		
36 Helio Super Couriers @ approx. $45,000 each	$1,620,000	
18 Helio H-500 Twins @ approx. $76,000 each	1,368,000	$2,988,000
Radio Equipment		
124 Pioneer Model 530's @ $750 each	93,000	
2 Central Transmitters @ $5,500 each	11,000	104,000
Spare Parts		
First Year:		
Aircraft	40,000	
Radio Equipment	2,475	
Second Year:		
Aircraft	105,000	
Radio Equipment	5,625	
Third Year:		
Aircraft	325,000	
Radio Equipment	9,200	487,300
Central Headquarters Buildings & Equipment		
Hangar Building	105,400	
Terminal Building (Operations, Administration & Training -- 30,000 square feet)	150,000	
Tools & Equipment	60,785	
Office & Miscellaneous Equipment	39,600	
Automotive Ground Support Equipment	14,000	369,785
Supporting Field Bases (2)		
Hangar & Operations Building @ $25,000 each	50,000	
Automotive Ground Support Equipment @ $3,500 each	7,000	
Tools & Equipment @ $10,000 each	20,000	77,000
Class "A" Airstrips (30)		
Operations Building & Equipment @ $1,800 each	54,000	54,000
Crating, Transportation, Insurance & Set-up Charges @ 10%		
Aircraft	298,800	
Radio Equipment	10,400	
Tools and Equipment	7,078	
Office & Miscellaneous Equipment	3,960	
Automotive Ground Support Equipment	1,750	
Spare Parts	48,730	370,718
		$4,450,803

TECHNICAL SERVICE COST ESTIMATE

During First Three Years	Annual	For Three Years
Technical Personnel (incl. per diem)	$ 80,500	$241,500
- Director of Operations		
- Chief Flight Instructor		
- Senior Maintenance Supervisor		
- Electrical & Instr. Supervisor		
- Airfield Development Engineer		
Staff Transportation (U.S. - Philippines)	17,500	52,500
Supervisory Conferences (4 per year)	15,500	46,500
U.S. Office, Administration & Overhead	22,800	68,400
Supporting Equipment (incl. Shipping)	17,200	51,600
Misc., Tel., Cables, etc. (Overseas)	1,500	4,500
Service Fee 10%	15,500	46,500
TOTAL, First Three Years	$170,500	$511,500

During Fourth & Fifth Years	Annual	For Two Years
Technical Personnel (incl. per diem)	$ 49,200	$ 98,400
- Director of Operations		
- Senior Maintenance Supervisor		
- Liaison Technician		
Staff Transportation (U.S. - Philippines)	9,800	19,600
Supervisory Conferences (3 per year)	12,000	24,000
U.S. Office, Administration & Overhead	12,900	25,800
Service Fee 10%	8,400	16,800
TOTAL, Fourth & Fifth Years	$ 92,300	$184,600
TOTAL FOR FIVE YEARS:		$696,100

Optional Technical Liaison after Fifth Year	Annual
Supervisory Conferences (2 per year)	$ 7,750
Liaison Engineer	16,800
Transportation & Communication	4,900
Professional Overhead	1,500
U.S. Staff & Reports (incl. U.S. Gov't. Liaison)	12,000
Service Fee 10%	4,300
	$ 47,250

OPERATING EXPENSES OF THE NAIRCOM SYSTEM

Salaries	First Year	Second Year	Third Year	Fourth and Following Years
Managerial, Administrative & Clerical	$ 42,600	$ 68,400	$ 76,500	$129,600
Pilots	21,900	85,650	153,900	212,400
Mechanics & Technicians	30,450	71,000	152,600	183,600
Sub-total Salaries	94,950	225,050	383,000	525,600
Fuel & Oil (1)	28,110	86,013	231,710	353,520
Legal & Accounting	9,450	22,500	38,300	52,600
Additional Overhead @ 7%	9,275	23,349	45,710	65,220
Contingency @ 5%	6,625	16,678	32,650	46,586
Depreciation & Replacement (2)	64,425	144,100	260,075	452,000
TOTAL YEARLY EXPENSES	$212,835	$517,690	$991,445	$1,495,526

Cost of Operation

Per plane mile	19.2¢
Per seat mile	3.8¢
Per mile passenger revenue required to break even at 60% load factor	6.4¢

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(1) Estimates based on 37½¢ per gallon cost for 100 octane aviation gas & $1.50 per gallon cost for aviation oil.

(2) Includes parts replacements after 3rd year.